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IS 635 (1982): Oil and Solvent Resistant Hose of Rubber
[PCD 13: Rubber and Rubber Products]



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IS : 635 – 1982
(Superseding IS : 3418 - 1968)
(Reaffirmed 2006)

Indian Standard

**SPECIFICATION FOR
OIL AND SOLVENT RESISTANT
HOSE OF RUBBER**

(Third Revision)

**Third Reprint AUGUST 2007
(Including Amendment No. 1)**

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**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002**

AMENDMENT NO. 1 JULY 1996
TO
IS 635 : 1982 SPECIFICATION FOR OIL AND
SOLVENT RESISTANT HOSE OF RUBBER

(Third Revision)

(Page 3, clause 0.4) — Substitute the following for the existing:

'0.4 This standard is an amalgamated revision of IS : 635 - 1968* and IS : 3418 - 1968† covering both the woven and braided constructions. Consequent to amalgamation, IS : 3418 - 1968 has been withdrawn.'

(Page 4, clause 2.1) — Substitute the following for the existing:

'2.1 For the purpose of this standard, definitions given in IS 7503 (Part 1) : 1988† and IS 7503 (Part 5) : 1988‡ shall apply.'

(Page 4, foot-note marked '†') — Substitute the following for the existing:

'†Glossary of terms used in rubber industry : Part 1 Definitions of basic terms (first revision).'

(Page 4, foot-note marked '‡') — Substitute the following for the existing:

'‡Glossary of terms used in rubber industry : Part 5 Definitions relating to products — Hoses (first revision).'

(Page 6, clause 3.3.2, line 2) — Substitute 'IS 3400 (Part 4) : 1987†' for 'IS : 3400 (Part IV) - 1978†'.

(Page 6, clause 3.3.3, line 5) — Substitute 'IS 3400 (Part 6) : 1983‡' for 'IS : 3400 (Part VI) - 1967‡'.

(Page 6, foot-note marked '†') — Substitute 'Part 4' for 'Part IV' and (second revision)' for '(first revision)'.

(Page 6, foot-note marked '‡') — Substitute 'Part 6 Resistance to liquids (first revision)' for 'Part VI Resistance to liquids'.

(Page 7, clause 3.3.4, line 2) — Substitute 'IS 3400 (Part 5) : 1986*' for 'IS : 3400 (Part V) - 1965*'.

(Page 7, foot-note marked '')* — Substitute the following for the existing:

Amend No. 1 to IS 635 : 1982

'*Methods of test for vulcanized rubbers : Part 5 Adhesion of rubbers to textile fabrics (*second revision*).'

(Page 7, clause 4) — Substitute the following for the existing:

'4 PACKING AND MARKING

4.1 Packing

The material shall be packed in packages as agreed to between the purchaser and the supplier.

4.2 Marking

4.2.1 Each length of the wrapped hose shall be indelibly marked adjacent to each end with the following:

- a) Name of the material,**
- b) Indication of the source of manufacture,**
- c) The hose dimensions and maximum working pressure,**
- d) Month and year of manufacture,**
- e) Net mass of the material, and**
- f) Lot/batch number.**

4.2.2 For long length moulded type of hose, the above markings shall be made after intervals of 15 metres approximately.

4.3.1 Each length of the hose may also be marked with the Standard Mark.

4.3.2 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to the manufacturers or producers may be obtained from the Bureau of Indian Standards.'

(Page 8, clause 6) — Substitute 'TEST METHODS' for 'TESTS'.

(Page 8, Appendix A) — Delete.

(PCD 13)

Indian Standard
SPECIFICATION FOR
OIL AND SOLVENT RESISTANT
HOSE OF RUBBER
(*Third Revision*)

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Indian Standard
SPECIFICATION FOR
OIL AND SOLVENT RESISTANT
HOSE OF RUBBER

(Third Revision)

0. FOREWORD

0.1 This Indian Standard (Third Revision) was adopted by the Indian Standards Institution on 10 January 1982, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 The rubber hose covered by this standard is suitable for use in conveying lubricating oils, transformer oils, vegetable oils (non-edible) and solvents having low aromatic content and designed for a working pressure of 0.7 MPa (1 MPa = 10.2 kg/cm² approximately).

0.3 IS : 635 was originally published in 1955 and subsequently revised in 1964 and 1968. Contrary to the line of thinking at ISO, a separate specification, IS : 3418-1968, for oil and solvent resistant hose of rubber with braided textile reinforcement was formulated. Sectional Committee has now decided to amalgamate these two standards.

0.4 This standard is an amalgamated revision of IS : 635-1968* and IS : 3418-1968† covering both the woven and braided constructions. Consequent to amalgamation, IS : 3418-1968 is being withdrawn. In this revision, number of reinforcement plies are given only for guidance in Appendix A along with outside diameters. In actual practice, these values may be either more or less than the recommended values.

0.5 Clauses 3.1.2 and 3.2.1 of this standard call for agreement between the purchaser and the supplier.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing

*Specification for oil and solvent resistant hose of rubber with woven textile reinforcement (*second revision*).

†Specification for oil and solvent resistant hose of rubber with braided textile reinforcement (*first revision*).

IS : 635 - 1982

the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for oil and solvent resistant hose of rubber suitable for conveying lubricating oils, transformer oils, vegetable oils (non-edible) and solvents having low aromatic content. This hose is designed for a working pressure of 0.7 MPa (1 MPa = 10.2 kg/cm² approximately).

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 7503 (Part I)-1974† and IS : 443-1975‡ shall apply.

3. REQUIREMENTS

3.1 Construction

3.1.1 Lining — The lining shall be seamless and consist of a suitable rubber compound resistant to oil and low aromatic solvents, reasonably uniform in thickness, smooth in bore, concentric, and free from porosity, air blisters and other defects.

3.1.2 Reinforcement — Reinforcement shall either be of woven fabric or of yarn indicated in 3.1.2.1 and 3.1.2.2 respectively as agreed to between the purchaser and the supplier.

3.1.2.1 Fabric reinforcement shall consist of plies of woven fabric, natural or synthetic or a combination thereof, applied on bias at approximately 45° angle. The woven fabric shall be well rubberized on both sides with a suitable rubber compound. The finishing end of the last ply shall overlap the start of the first ply at least by 6 mm.

3.1.2.2 The braided textile reinforcement shall consist of yarn, natural or synthetic or a combination thereof with braided or spiral type construction. It shall be firmly and evenly braided over the lining. The braided plies shall be impregnated with a suitable rubber compound or shall have suitable rubber compound in between the plies.

*Rules for rounding off numerical values (revised).

†Glossary of terms used in rubber industry, Part I.

‡Methods of sampling and test for rubber hoses (second revision).

3.1.3 Cover — The cover shall consist of a suitable rubber compound resistant to oils and solvents having low aromatic content. It shall be reasonably uniform in thickness, concentric, and free from air blisters, porosity and splits. The cover of the moulded hose shall be smooth or fluted as required. Hoses manufactured on mandrels may have a cloth marked finish and the whole shall be consolidated by wrapping and uniform vulcanizing.

3.2 Dimensions and Tolerances

3.2.1 Bore Size — The bore sizes when measured according to the method prescribed in 4.2.1.2 of IS : 443-1975* shall be as given in Table 1.

Other sizes within this range may be supplied by agreement between the purchaser and the supplier. The tolerances shall be those of the next smaller size.

TABLE 1 NOMINAL BORE SIZE AND TOLERANCE ON NOMINAL BORE SIZE

NOMINAL BORE SIZE IN mm (1)	TOLERANCE ON NOMINAL BORE SIZE IN mm (2)
5.00	± 0.75
6.30	± 0.75
8.00	± 0.75
10.00	± 0.75
12.50	± 0.75
16.00	± 0.75
20.00	± 0.75
25.00	± 1.25
31.50	± 1.25
38.00	± 1.50

3.2.2 Lining and Cover Thickness — The thickness of the lining and cover of the hose when measured according to the method prescribed in 4.2.2 of IS : 443-1975*, shall not be less than that specified in Table 2.

3.2.3 Length — The standard length of the hose shall be 15 m.

3.2.3.1 The tolerance on any specified hose length shall be ± 1 percent.

*Methods of sampling and test for rubber hoses (*second revision*).

TABLE 2 LINING AND COVER THICKNESS

(Clause 3.2.2)

NOMINAL BORE SIZE IN mm	LINING THICKNESS IN mm	COVER THICKNESS IN mm
(1)	(2)	(3)
Up to and including 20·00	1·5	1·0
Over 20·00 and including 38·00	2·00	1·0

3.3 Requirement of Physical Tests on Finished Hose

3.3.1 Tensile Strength and Elongation at Break of Lining and Cover — The tensile strength and elongation at break of the rubber used for the lining and cover of the hose, when tested according to the method prescribed in 5 of IS : 443-1975*, shall be as specified in Table 3.

TABLE 3 TENSILE STRENGTH AND ELONGATION AT BREAK OF THE LINING AND COVER

CHARACTERISTIC	REQUIREMENTS FOR LINING AND COVER
(1)	(2)
Tensile strength, MN/m ² , <i>Min</i>	5·5
Elongation at break, percent, <i>Min</i>	250

3.3.2 Accelerated Ageing Tests — After ageing at $100 \pm 1^\circ\text{C}$ for a period of 72 hours in accordance with the method prescribed in IS : 3400 (Part IV)-1978†, the rubber used for lining and cover of the hose shall not vary by more than ± 25 percent for the tensile strength and $\pm \frac{10}{45}$ percent for elongation at break over the corresponding values obtained before ageing when tested according to the method prescribed in 5 of IS : 443-1975*.

3.3.3 Swelling Test — The lining and cover of the hose after immersion in the test liquid containing 30 parts by volume of toluene and 70 parts by volume of *iso*-octane, shall not change in volume by more than +100 percent when immersed for a period of 24 hours at room temperature and tested according to the method prescribed in IS : 3400 (Part VI)-1967‡.

*Methods of sampling and test for rubber hoses (*second revision*).

†Methods of test for vulcanized rubber : Part IV Accelerated ageing (*first revision*).

‡Methods of test for vulcanized rubbers: Part VI Resistance to liquids.

3.3.4 Adhesion Strength — The strength of adhesion when tested according to Method A of IS : 3400 (Part V)-1965* shall be such that the rate of separation shall not exceed 25 mm per minute under 3.5 kg load for the following:

- a) Between reinforcement plies,
- b) Between lining and reinforcement plies, and
- c) Between cover and reinforcement plies.

3.3.5 Hydraulic Test — The minimum bursting pressure of the hose shall not be less than 2.1 MPa, when tested according to the method prescribed in 8 of IS : 443-1975†.

3.3.6 Proof Pressure Test — Samples of production length of hose when subjected to internal hydraulic pressure 1.5 times that of the working pressure for one minute, shall not show any rupture, leakage or porosity, when tested according to the method prescribed in 8.3 of IS : 443-1975†.

NOTE — This test shall be carried out at the factory. If the hose is offered at places other than the factory, manufacturer's certificate should be accepted.

4. MARKING

4.1 Each length of the wrapped hose shall be indelibly marked adjacent to each end with:

- a) The manufacturer's name or trade mark, if any;
- b) The hose denomination and maximum working pressure; and
- c) Month and year of manufacture, if required by the purchaser.

4.1.1 For long length moulded type of hose, the above markings shall be made at intervals of 15 metres approximately.

4.1.2 The product may also be marked with Standard Mark.

4.1.3 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

5. SAMPLING AND CRITERIA FOR CONFORMITY

5.1 For the purpose of ascertaining the conformity of hoses in a consignment to this specification, the scale of sampling and the criteria for conformity shall be as prescribed in 3 of IS : 443-1975†.

*Methods of test for vulcanized rubbers: Part V Adhesion of rubbers to textile fabrics.

†Methods of sampling and test for rubber hoses (second revision).

6. TESTS

6.1 Unless otherwise agreed to between the purchaser and the supplier, all tests shall be carried out within 3 months from the date of receipt of the material by the purchaser.

APPENDIX A

(Clause 0.4)

**RECOMMENDED MINIMUM OUTSIDE DIAMETER AND
NUMBER OF REINFORCEMENT PLIES****A-1. OUTSIDE DIAMETER AND NUMBER OF REINFORCEMENT
PLIES**

A-1.1 The recommended outside diameter and the number of reinforcement plies of the hose shall be as given in Table 4.

**TABLE 4 RECOMMENDED OUTSIDE DIAMETER AND NUMBER OF
REINFORCEMENT PLIES**

NOMINAL BORE SIZE IN mm	REINFORCEMENT TYPE			
	Woven Textile		Braided Textile	
	No. of plies	Outside diameter in mm	No. of plies	Outside diameter in mm
(1)	(2)	(3)	(4)	(5)
5.0	2	12.0	1	10.5
6.3	2	13.0	1	12.0
8.0	2	15.0	1	13.5
10.0	2	17.0	1	15.5
12.5	2	19.5	1	18.0
16.0	2	23.0	1	21.5
20.0	3	28.0	1	25.0
25.0	4	35.0	2	33.0
31.5	4	42.0	2	40.0
38.0	4	48.5	2	47.0

NOTE — Plies mentioned above may be varied by 1 ply provided the hose meets with the requirements of this specification.

(Continued from page 2)

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